

## SHORT CHANGE GEAR

Priority from the European Patent Application 03100580.4 is claimed, the content of which is herewith incorporated entirely by reference.

### FIELD OF THE INVENTION

The present invention relates generally to transmissions for use in motor vehicles and, more particularly, to a short change gears.

### BACKGROUND OF THE INVENTION

A transmission is known from the European Patent EP 1 067 312. This kind of transmission can be configured as manual or automatic change gear or also as a power shift gear. In all of these variations the 2 output shafts are in torque transmitting connection with the drive shaft. In the manual and the automatic gear change version the transmission is provided with an input shaft that is connected by means of several gear sets with the first and with the second output shaft. Each gear set is provided with a fixed gear and a shiftable loose gear. Even though all gear shift mechanisms for shifting the loose wheels are located on the output shafts the interleaved positions of the fixed gears on the input shaft results in a certain overall length of the transmission that is longer than the space needed just for the loose wheels with the gear shift mechanisms. This applies also for the power shift gear version comprising 2 input shafts positioned coaxially to each other and that are likewise interconnected with the output shafts by means of several gear sets.

In the US 6 427 550 a twin-clutch transmission is described comprising one input shaft and one intermediate shaft, said intermediate shaft being connected by means of a chain drive with a transfer shaft coaxially disposed in relation to the input shaft. Input shaft and intermediate shaft are connected by means of several wheel sets with the output

shaft. Even though this avoids the problem of interleaved positioning of the various gear sets since the loose wheels on the intermediate shaft and on the input shaft mesh with the same fixed wheels on the output shaft it is a known problem in the prior art that such

## CLAIMS

1. (Amended) Short change gear, in particular for motor vehicles, comprising
  - at least a first input shaft;
  - a second input shaft
  - a first output shaft;
  - a second output shaft;
  - a drive shaft that is in torque transmitting connection with the first and second output shafts;
  - a first group of gear sets comprising at least one first gear set;
  - a second group of gear sets comprising at least one second gear set and being radially offset with respect to the first group of gear sets;
  - an intermediate shaft;
  - a first gear section in which the first input shaft is connectable with the first output shaft by means of the first group of gear sets;
  - a second gear section in which the intermediate shaft is connectable to the second output shaft by means of the second group of gear sets;
  - wherein the intermediate shaft is in gearing connection with the first-second input shaft;
2. (Amended twice) The short change gear of claim 1 further comprising:
  - a first drive pinion provided on the first output shaft;
  - a second drive pinion provided on the second output shaft;
  - wherein a plane in which the intermediate shaft being is in gearing connection with the first-second input shaft as well as;
  - wherein the first and second drive pinions are positioned in one and the same plane.
3. (Original) The short change gear of claim 1 wherein the second gear section comprises the second group of gear sets, at least one of these gear sets being positioned in front and at least one of these gear sets being positioned behind the gearing connection of the

intermediate shaft to the second input shaft when viewed in either one of the 2 longitudinal directions of the intermediate shaft.

4. (Original) The short change gear of claim 1 wherein the number of second gear sets in the second gear section is at least as high as the number of first gear sets in the first gear section.

5. (Cancelled) The short change gear of claim 1 further comprising:  
~~— a clutch adapted to connect the first input shaft with a motor shaft;~~  
~~— wherein the first input shaft is connectable to the first output shaft and is connected by means of the gearing connection with the intermediate shaft.~~

6. (Amended twice) The short change gear of claim 1 further comprising:  
loose wheels being part of the first and second gear sets; and  
mutual synchronizing mechanisms;  
wherein the loose wheels of the gear sets in the gear sections are shifted by means of the mutual synchronizing mechanisms and the gear sets relate to consecutive forward gears.

7. (Cancelled) The short change gear of claim 1 wherein the first gear section comprises the gear sets for the 5<sup>th</sup> and the 6<sup>th</sup> gear, while the second gear section comprises the gear sets for the 1<sup>st</sup> to the 4<sup>th</sup> gear.

8. (Cancelled) The short change gear of claim 7 further comprising:  
~~a reverse gear set in the first gear section, said reverse gear set comprising:~~  
~~— a fixed wheel;~~  
~~— a loose wheel;~~  
~~— an intermediate wheel; and~~  
~~— a shaft bearing the intermediate wheel.~~

9. (Cancelled) The short change gear of claim 1 further comprising:

~~— a clutch at one end of the first input shaft;~~

~~wherein the gearing connection is located on the first input shaft spaced apart from that end of the first input shaft where the clutch is provided.~~

10. (Amended) The short change gear of claim 1 further comprising:

a first clutch;

a second clutch;

~~a second input shaft;~~

~~— wherein a motor shaft is connectable by means of the first clutch with the first input shaft that is connectable with the first output shaft; and~~

wherein the motor shaft is connectable by means of the second clutch with the second input shaft that is positioned in coaxial relation to the first input shaft, and said second input shaft is connected to the intermediate shaft by means of the gearing connection.

11. (Original) The short change gear of claim 10 wherein the first gear section does not comprise any gear sets for even-numbered forward gears and the second gear section does not comprise any gear sets for odd-numbered forward gears.

12. (Original) The short change gear of claim 10 wherein the first gear section does not comprise any gear sets for odd-numbered forward gears and the second gear section does not comprise any gear sets for even-numbered forward gears.

13. (Original) The short change gear of claim 10 wherein the first gear section comprises the gear sets for the 2<sup>nd</sup>, 4<sup>th</sup> and 6<sup>th</sup> gear, and the second gear section comprises the gear sets for the 1<sup>st</sup>, 3<sup>rd</sup> and 5<sup>th</sup> gear.

14. (Original) The short change gear of claim 10 further comprising  
a fixed wheel;  
a loose wheel;  
an intermediate wheel rotatably borne on a shaft;  
wherein the second gear section comprises a gear set for ~~at~~ the reverse gear in  
which the fixed wheel is connected to the loose wheel by means of the  
intermediate wheel.
15. (Original) The short change gear of claim 1 further comprising:  
a pump shaft connected to a motor shaft and provided coaxially and within the  
first input shaft that is designed as a hollow shaft.
16. (Amended) The short change gear of claim 1 wherein the gearing connection between  
the intermediate shaft and the ~~first~~ second input shaft comprises gears on both shafts and  
an intermediate gear.
17. (Cancelled) ~~The short change gear of claim 1 wherein the gearing connection between  
the intermediate shaft and the first input shaft comprises a chain drive.~~
18. (Amended) Use of the change gear of claim 105 as a manual change gear for motor  
vehicles.
19. (Amended) Use of the change gear of claim 105 as an automatic change gear for  
motor vehicles.
20. (Amended) Use of the change gear of claim 105 as a power shift gear for motor  
vehicles.
21. (Original) Use of the change gear of claim 1 as a change gear installed in lengthwise  
orientation in a motor vehicle.

22. (Original) Use of the change gear of claim 1 as a change gear installed in transverse orientation in a motor vehicle.